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SPECIFICATION FOR INSULATOR FITTINGS FOR OVERHEAD POWER LINES WITH A NOMINAL VOLTAGE UP TO AND INCLUDING 1 000 V

(Third Reprint JANUARY 1992)

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NEW DELHI 110002

Gr 3 *April* 1976

Indian Standard

SPECIFICATION FOR INSULATOR FITTINGS FOR OVERHEAD POWER LINES WITH A NOMINAL VOLTAGE UP TO AND INCLUDING 1 000 V

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SPECIFICATION FOR INSULATOR FITTINGS FOR OVERHEAD POWER LINES WITH A NOMINAL VOLTAGE UP TO AND INCLUDING 1 000 V

0. FOREWORD

0.1 This Indian Standard was adopted by the Indian Standards Institution on 30 December 1975, after the draft finalized by the Electrical Insulators and Accessories Sectional Committee had been approved by the Electrotechnical Division Council.

0.2 This standard has been prepared with a view to specifying the requirements of insulator fittings suitable for porcelain insulators covered in IS : 1445-1966*.

0.2.1 Insulator fittings for overhead power lines with a nominal voltage greater than 1 000 volts are covered by the following Indian Standards:

IS : 2486 (Part I)-1971 Specification for insulator fittings for overhead power lines with a nominal voltage greater than 1 000 V: Part I General requirements and tests (*first revision*)

IS : 2486 (Part II)-1974 Specification for insulator fittings for overhead power lines with a nominal voltage greater than 1 000 V: Part II Dimensional requirements

IS : 2486 (Part III)-1974 Specification for insulator fittings for overhead power lines with a nominal voltage greater than 1 000 V: Part III Locking devices

0.3 The dimensional and other requirements of the insulator fittings required for special applications shall be subject to agreement between the purchaser and the supplier.

0.4 There is a separate standard available for conductor fittings (*see* IS : 2121-1962†).

---

*Specification for porcelain insulators for overhead power lines (below 1 000 V) (*revised*).

†Specification for fittings for aluminium and steel cored aluminium conductors for overhead power lines.

0.5 For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test, shall be rounded off in accordance with IS : 2-1960*. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

1. SCOPE

1.1 This standard covers requirements, dimensions and test methods for insulator fittings for use on overhead power lines with a nominal voltage up to and including 1 000 V.

2. TERMINOLOGY

2.0 For the purpose of this standard, the following definitions shall apply.

2.1 Insulator Pin — A rigid fitting for attaching a pin insulator (*see* IS . 1445-1966†) to a supporting structure.

NOTE — Complete details of the insulator pin are shown in Fig. 1 and 2

2.2 Shackle Insulator Fittings — An assembly of metal parts used for flexibly attaching a shackle insulator (*see* IS . 1445-1966†) to the supporting structure and to secure in tension a line conductor. This assembly essentially comprises the following:

a) A pair of mild steel straps,

b) Two numbers of mild steel bolts with hexagonal head,

c) Two numbers of mild steel nuts of hexagonal head to suit bolts under item (b) and of suitable thickness, and

d) Two numbers of suitable washers.

NOTE — The complete details of the shackle insulator fittings to be used with steel cross arms are shown in Fig 3, 4, 5 and 6.

2.3 Type Tests — Tests carried out to prove conformity with the specification. These are intended to prove the general qualities and design of a given type of insulator fitting.

2.4 Acceptance Tests — Tests carried out on samples taken from a lot for the purpose of acceptance of the lot.

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*Rules for rounding off numerical values (*revised*).

†Specification for porcelain insulators for overhead power lines (below 1 000 V) (*revised*).

AMENDMENT NO. 3 NOVEMBER 1988
TO
IS : 7935 - 1975 SPECIFICATION FOR INSULATOR FITTINGS FOR OVERHEAD POWER LINES WITH A NOMINAL VOLTAGE UP TO AND INCLUDING 1 000 V

(*Page* 5, *clause* 3.1.3) — Insert the following at the end of this clause:
'The thickness of the hexagon nuts shall be in accordance with IS : 1363 (Part 3) - 1984*. The screw threads on the shank and the nut shall be as specified in IS : 4218 (Part 6) - 1978†.'

(*Page* 7, *Fig* 3) — Delete the dimension '12' shown as the thickness of the nut of the shackle pin.

---

*Hexagon head bolts, screws and nuts of product grade C: Part 3 Hexagon nuts (size range M 5 to M 36) (*second revision*)

†ISO metric screw threads: Part 6 Limits of sizes for commercial bolts and nuts (diameter range 1 to 52 mm) (*first revision*).

(ETDC 3)

Reprography Unit, BIS, New Delhi, India

AMENDMENT NO. 1 JUNE 1982

TO

IS:7935-1975 SPECIFICATION FOR INSULATOR FITTINGS FOR OVERHEAD POWER LINES WITH A NOMINAL VOLTAGE UP TO AND INCLUDING 1 000 V

Alteration

(*Page 7, Fig. 3, thickness of the nut for* 'M12' *bolt*) - Delete '12'.

(ETDC 3)

Reprography Unit, BIS, New Delhi, India

2.4.1 *Lot* — All the insulator fittings of the same type and design manufactured under similar conditions of production, offered for acceptance; a lot may consist of the whole or part of the quantity offered.

2.5 Routine Tests — Tests carried out on each insulator fitting to check requirements which are likely to vary during production.

3. INSULATOR FITTINGS

3.1 Insulator Fitting Materials

3.1.1 The insulator pins shall either be fabricated or forged. The fabricated pins shall be of mild steel rods and forged pins shall be of steel complying with Class 2 of IS: 2004-1970*.

3.1.2 The straps and bolts shall be of mild steel.

3.1.3 The nuts shall be made of material conforming to class 4·8 of IS : 1367-1967† with regard to its mechanical properties.

3.1.4 For galvanizing, zinc conforming to Grade Zn 98 of IS:209-1966‡ shall be used (*see also* Note under **3.2.2**).

Note — For details *see* IS : 2629-1966§.

3.2 General Requirements

3.2.1 The insulator fittings shall be of good finish, free from flaws and other defects. The edges on the outside of fittings, such as at the holes, shall be rounded.

3.2.2 All ferrous components, except those made of stainless steel, if any, shall be galvanized. Small fittings like spring washers, nuts, etc, may be electro-galvanized. Threads of nuts and tapped holes, when cut after galvanizing, shall be well oiled or greased.

Note — In view of the scarcity of zinc which is used for galvanizing, other types of corrosion protection, such as aluminizing, may be used subject to agreement between the purchaser and the supplier. It is not possible to give definite specifications for such alternatives at present but these are expected to be included later.

---

*Specification for carbon steel forgings for general engineering purposes (*first revision*).

†Technical supply conditions for threaded fasteners (*first revision*).

‡Specification for zinc (*second revision*).

§Recommended practice for hot-dip galvanizing of iron and steel.

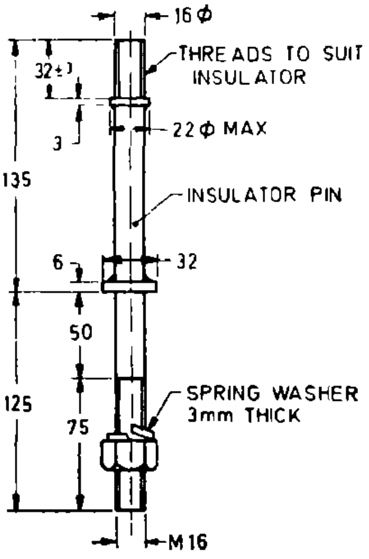
3.2.3 *Dimensions* — The dimensions of the fittings shall conform to Fig. 1 to 6 as follows:

a) The dimensions of fabricated pin shall conform to Fig. 1.

b) The dimensions of forged pin shall conform to Fig. 2.

c) The dimensions of shackle insulator fittings shall conform to Fig. 3 and 4 for type 1 and type 2 shackle insulator respectively specified in IS : 1445-1966*.

d) Where vertical formation of conductor is used, the dimensions of shackle insulators fittings shall conform to Fig. 5 and 6 respectively, for type 1 and type 2 shackle insulators specified in IS : 1445-1966*.



NOTE 1 — The dimension of 50 mm is fixed on the basis that the minimum size of the angle iron used on such installations is not less than 50 mm.

NOTE 2 — The tolerances for dimensions when not indicated in the drawing shall be agreed to between the purchaser and the supplier, if necessary.

All dimensions in millimetres.

FIG. 1 DETAILS OF FABRICATED INSULATOR PIN

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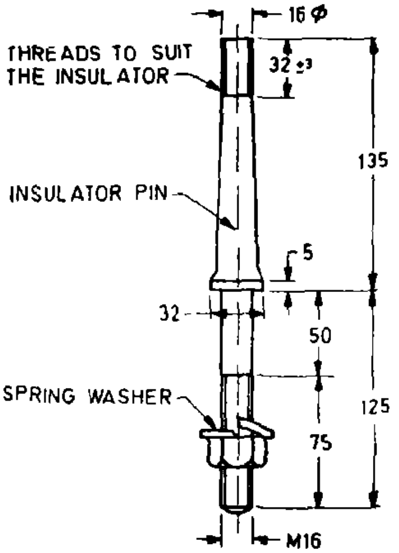
*Specification for porcelain insulators for overhead power lines (below 1 000 volts) (*revised*).

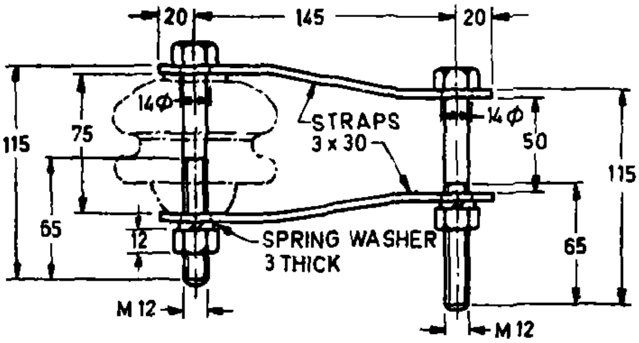


NOTE 1 — The dimensions of 50 mm is fixed on the basis that the minimum size of the angle iron used on such installations is not less than 50 mm.

NOTE 2 — The tolerances for dimensions when not indicated in the drawing shall be agreed to between the purchaser and the supplier, if necessary.

All dimensions in millimetres.

FIG. 2 DETAILS OF FORGED INSULATOR PIN

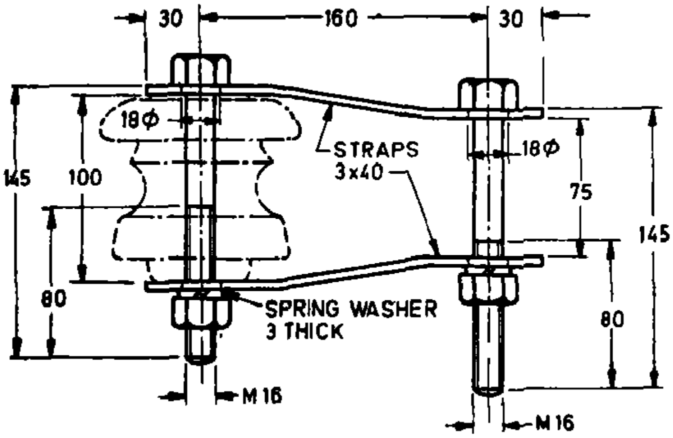


NOTE 1 — The length of the bolt 115 mm is fixed on the basis that the maximum size of the cross arm in use does not exceed 75 mm.

NOTE 2 — The tolerances for dimensions when not indicated in the drawing shall be agreed to between the purchaser and the supplier, if necessary.

All dimensions in millimetres.

FIG. 3 DETAILS OF FITTINGS FOR SHACKLE INSULATOR TYPE 1

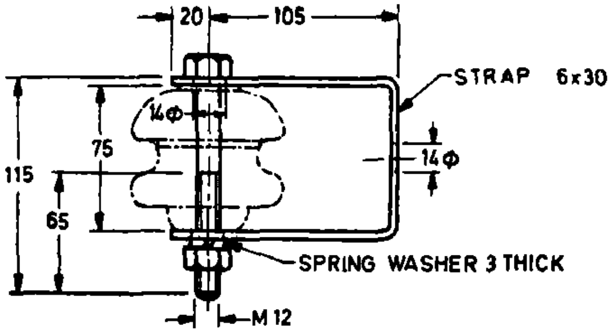


NOTE 1 — The length of bolt 145 mm is fixed on the basis that the maximum size of the cross arm in use does not exceed 100 mm.

NOTE 2 — The tolerances for dimensions when not indicated in the drawing shall be agreed to between the purchaser and the supplier, if necessary.

All dimensions in millimetres.

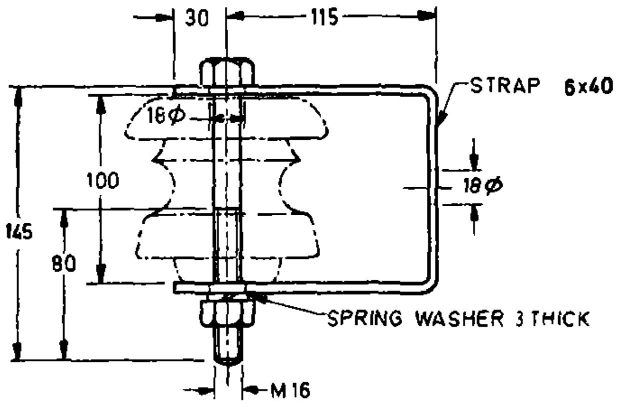
FIG. 4 DETAILS OF FITTINGS FOR SHACKLE INSULATOR TYPE 2



NOTE — The tolerances for dimensions when not indicated in the drawing shall be agreed to between the purchaser and the supplier, if necessary.

All dimensions in millimetres.

FIG. 5 DETAILS OF FITTINGS FOR SHACKLE INSULATOR TYPE 1 FOR VERTICAL FORMATION OF CONDUCTORS



Note — *The tolerances for dimensions when not indicated in the drawing shall be* agreed to between the purchaser and the supplier, if necessary.

All dimensions in millimetres.

Fig. 6 Details of Fittings for Shackle Insulator Type 2 for Vertical Formation of Conductors

4. TEST

4.1 Type Tests — The following shall constitute the type tests:

a) Visual examination test (**4.4**),

b) Verification of dimensions (**4.5**),

c) Checking of threads on heads (**4.6**),

d) Galvanizing/electroplating test (**4.7**), and

e) Mechanical strength test (**4.8**) (for pin insulator fitting only).

Note 1 — Type tests are normally made once and unless otherwise agreed to test certificates giving the results of type tests, made on not less than three fittings, identical in all essential details with those to be supplied are regarded as evidence of compliance.

Note 2 — Type tests shall be made and certified by the manufacturer or by an agreed independent authority.

Note 3 — Type tests shall be made on the fittings that have passed the routine test.

4.2 Acceptance Tests — The following shall constitute the acceptance tests:

a) Checking of threads on heads (**4.6**), and

b) Galvanizing test (**4.7**).

4.2.1 For carrying out acceptance tests specified in this standard, the sampling procedure given in Appendix A is recommended. Such tests are not applicable when the order is for less than 100 identical fittings.

4.3 Routine Test — Visual examination test (**4.4**) shall be carried out as routine test.

4.4 Visual Examination Test — All insulator fittings shall be checked visually for good workmanship and finish.

4.5 Verification of Dimensions — The dimensions of the fittings shall be checked in accordance with **3.2.3**. The gauges may be used when applicable.

4.6 Checking of Threads on Heads — The dimensions of the threads of heads of insulator pins shall be checked by means of gauges.

4.7 Galvanizing Test — The uniformity of zinc coating for hot-dipped galvanized ferrous parts shall satisfy the requirement of IS : 2633-1964* (*see also* Note under **3.2.2**). Electro-galvanized ferrous fittings shall be checked in accordance with IS : 1573-1970†.

4.8 Mechanical Strength Test — This test shall be carried out in accordance with **4.6** of IS : 2486 (Part I)-1971‡ for pin insulator fittings.

The minimum failing loads of the insulator pin shall be as follows:

Type	*Minimum Failing Load*
Fabricated pin (Fig. 1)	2 kN
Forged pin (Fig. 2)	3·5 kN

NOTE — 1N = 0 101 922 kgf

5. MARKING

5.1 The fittings shall be marked with the manufacturer's name or trademark.

5.1.1 The packages containing the insulator fittings may also be marked with the ISI Certification Mark.

NOTE — The use of the ISI Certification Mark is governed by the provisions of the Indian Standards Institution (Certification Marks) Act and the Rules and Regulations made thereunder. The ISI Mark on products covered by an Indian Standard conveys the assurance that they have been produced to comply with the requirements of that standard under a well-defined system of inspection, testing and quality control which is devised and supervised by ISI and operated by the producer. ISI marked products are also continuously checked by ISI for conformity to that standard as a further safeguard. Details of conditions under which a licence for the use of the ISI Certification Mark may be granted to manufacturers or processors, may be obtained from the Indian Standards Institution.

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*Methods of testing weight, thickness and uniformity of coating on hot-dipped galvanized articles.

†Specification for electroplated coatings for zinc on iron and steel (*first revision*).

‡Specification for insulator fittings for overhead power lines with a nominal voltage greater than 1 000 V: Part I General requirements and tests (*first revision*).

AMENDMENT NO. 2 FEBRUARY 1983

TO

IS:7935-1975 SPECIFICATION FOR INSULATOR FITTINGS FOR OVERHEAD POWER LINES WITH A NOMINAL VOLTAGE UP TO AND INCLUDING 1 000 V

Alterations

(*Page 10, clause 4.8*) - Substitute the following for the existing clause:

'4.8 Mechanical Strength Test - Shank of the insulator pin shall be rigidly attached to the testing machine. A rigid metal extension piece shall be attached directly to the head of the pin. A load shall be applied to the extension piece 10 mm above the top of the pin. The load applied, at right angle to the axis of the insulator pin, shall be increased to the specified minimum failing load at a steady rate. The permanent deformation measured at the top of the pin head after the load has been released, shall not exceed 20 percent of the distance of this point from the support.

The minimum failing load of the insulator pin shall be as follows:

Type	*Minimum Failing Load*
Fabricated (Fig. 1)	2 kN
Forged Pin (Fig. 2)	2 kN

NOTE - 1N = 0.101922 kgf.'

(*Page 10, foot-note with '‡' mark*) - Delete.

(ETDC 3)

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6. PACKING

6.1 For packing of the insulator fittings, double gunny bags, or wooden cases if deemed necessary, shall be employed. The gross mass of the packing shall not normally exceed 50 kg. All nuts shall be hand-tightened over the bolts and screwed up to the farthest point.

APPENDIX A

(*Clause* 4.2.1)

RECOMMENDED SAMPLING PROCEDURE

A-1. LOT

A-1.1 In any consignment, all the insulator fittings of the same type and design manufactured under similar conditions of production shall be grouped together to constitute a lot.

A-2. SAMPLE SIZE

A-2.1 The number of fittings to be selected at random from the lot shall be in accordance with col 1 and 2 of Table 1. If required (*see* **A-3**) additional insulator fittings as given in col 3 of Table 1 shall also be selected at random.

TABLE 1 SAMPLE SIZE AND CRITERION FOR CONFORMITY

Lot Size N (1)	First Sample Size n_1 (2)	Second Sample Size n_2 (3)	Acceptance Number c_1 (4)	Rejection Number c_2 (5)
101 to 500	5	10	0	2
501 ,, 800	7	14	0	3
801 ,, 1 300	10	20	0	3
1 301 ,, 3 200	15	30	1	4
3 201 ,, 8 000	25	50	2	5
8 001 and above	35	70	2	7

A-2.2 All the insulator fittings selected as in **A-2.1** shall be subjected to the appropriate acceptance tests.

A-3. CRITERION FOR CONFORMITY

A-3.1 The lot shall be considered as conforming to the requirements of the acceptance tests if the number of failures found in the first sample n_1 is less than or equal to c_1. If the number of failures is greater than or equal to c_2, the lot shall be considered as not conforming to the requirements of the acceptance tests and shall be rejected. If the number of failures is between c_1 and c_2, a second sample of n_2 insulator fittings shall be selected and subjected to acceptance tests. If the number of failures in the two samples combined is less than c_2, the lot shall be considered as conforming to the requirements of acceptance tests otherwise it shall be considered to have failed.

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